

USAWC STRATEGY RESEARCH PROJECT

**AN EXAMINATION OF THE DEFENSE INDUSTRIAL
BASE'S ABILITY TO SUPPORT THE DEFENSE
DEPARTMENT AT WAR WHILE TRANSFORMING**

by

Colonel James R. Ralph III
United States Army

Colonel Chris Paparone
Project Advisor

This SRP is submitted in partial fulfillment of the requirements of the Master of Strategic Studies Degree. The views expressed in this student academic research paper are those of the author and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

U.S. Army War College

Report Documentation Page			Form Approved OMB No. 0704-0188		
Public reporting burden for the collection of information is estimated to average 1 hour per response, including the time for reviewing instructions, searching existing data sources, gathering and maintaining the data needed, and completing and reviewing the collection of information. Send comments regarding this burden estimate or any other aspect of this collection of information, including suggestions for reducing this burden, to Washington Headquarters Services, Directorate for Information Operations and Reports, 1215 Jefferson Davis Highway, Suite 1204, Arlington VA 22202-4302. Respondents should be aware that notwithstanding any other provision of law, no person shall be subject to a penalty for failing to comply with a collection of information if it does not display a currently valid OMB control number.					
1. REPORT DATE 03 MAY 2004		2. REPORT TYPE		3. DATES COVERED -	
4. TITLE AND SUBTITLE An Examination of the Defense Industrial Base's Ability to Support the Defense Department at War while Transforming				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) James Ralph				5d. PROJECT NUMBER	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army War College, Carlisle Barracks, Carlisle, PA, 17013-5050				8. PERFORMING ORGANIZATION REPORT NUMBER	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)				10. SPONSOR/MONITOR'S ACRONYM(S)	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION/AVAILABILITY STATEMENT Approved for public release; distribution unlimited					
13. SUPPLEMENTARY NOTES					
14. ABSTRACT See attached file.					
15. SUBJECT TERMS					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES 36	19a. NAME OF RESPONSIBLE PERSON
a. REPORT unclassified	b. ABSTRACT unclassified	c. THIS PAGE unclassified			

CARLISLE BARRACKS, PENNSYLVANIA 17013

ABSTRACT

AUTHOR: James R. Ralph III

TITLE: Examination of the Defense Industrial Base's Ability to Support the Defense Department at War while Transforming

FORMAT: Strategy Research Project

DATE: 19 March 2004 PAGES: 36 CLASSIFICATION: Unclassified

Since the start of the cold war, the defense industrial complex has been a substantial contributor to the military element of U.S. national power. However, while the U.S. military demonstrated superb performance in Afghanistan and Iraq, many were surprised by disappointing examples of the defense industry's failures to respond to surge requirements and its reliance on foreign suppliers. There are many reasons for the failures both on the industry side and on the department of defense (DoD) side, but is the defense industry in decline? While the current business environment presents challenges for defense contractors such as globalization, mergers, reduced demand, and pricing pressure from foreign sources, the DoD is also experiencing challenges associated with transformation, budget pressures, and an unanticipated level of deployment requirements associated with a new threat and the global war on terrorism. Without adequate and practical assessment tools and policy, adequate funding and an industry transformation to address these challenges, U.S. security could be at risk. This paper examines the current defense industry and the national security environment, and it suggests recommendations to set conditions to enable the defense industrial base to provide innovative and affordable capabilities to the nation at war while transforming.

TABLE OF CONTENTS

ABSTRACT.....	IV
LIST OF ILLUSTRATIONS	VIII
AN EXAMINATION OF THE DEFENSE INDUSTRIAL BASE’S ABILITY TO SUPPORT THE DEFENSE DEPARTMENT AT WAR WHILE TRANSFORMING	1
STRATEGIC GUIDANCE AND CHANGING WARFARE CONCEPTS.....	1
SHAPING THE DEFENSE INDUSTRIAL BASE.....	4
LAW AND POLICY	4
ORGANIZATIONS SHAPING THE INDUSTRIAL BASE	5
INTERAGENCY	6
ENVIRONMENTAL TRENDS IN INDUSTRY (SUPPLY SIDE)	7
GLOBALIZATION	7
CONSOLIDATIONS	8
INDUSTRY SUPPORT DURING WAR	10
STATE OF CRITICAL SECTORS AND PROSPECTS FOR THE FUTURE	11
Aircraft.....	11
Land Combat Systems.....	11
Shipbuilding.....	12
Information Technology	12
Battlespace Awareness	13
TRENDS IN DOD (DEMAND SIDE).....	14
DOD AS A CUSTOMER	14
INVESTMENT TRENDS, PROJECTIONS, AND IMPLICATIONS.....	15
RECOMMENDATIONS.....	16
CONCLUSIONS	16
ENDNOTES	19

BIBLIOGRAPHY	25
--------------------	----

LIST OF ILLUSTRATIONS

FIGURE 1. THE MILITARY-INDUSTRIAL COMPLEX.....	2
FIGURE 2. TRANSFORMING THE DEFENSE INDUSTRIAL BASE ROADMAP	5

AN EXAMINATION OF THE DEFENSE INDUSTRIAL BASE'S ABILITY TO SUPPORT THE DEFENSE DEPARTMENT AT WAR WHILE TRANSFORMING

The days are long gone when troops could forge their own musket balls around the campfire the night before the battle. Our war effort is as dependent upon a healthy defense industrial base as it is on the young Americans currently manning its high quality products.¹

—Edward C. Aldridge Jr.
Five Goals, 4 February 2002.

Since the start of the cold war or perhaps World War II, the defense industrial complex has been a robust and substantial contributor to the military element of U.S. national power. However, just as recent operations in Afghanistan and Iraq have highlighted the need for transformational warfighting capabilities, the current business and defense landscape underscores the need for a transformational defense industry.² The concept of warfare is being transformed, warfighting capabilities are being transformed, and the industry that will support defense will transform to sustain the security of the U.S.³ This paper examines the factors that will impact the transformation of the defense industrial base, that part of the total privately-owned and Government-owned industrial production and maintenance capacity of the United States and Canada, which will be available during national emergencies to manufacture and repair items required by the departments.⁴ It does this by addressing the “military-industrial complex,” a multifarious network of entities that has significant impact on production of military capabilities seen in figure 1. It will start by looking at the strategic direction of the President, transformation initiatives of the Secretary of Defense, and the new operational warfighting concepts from the Joint Staff. It then turns to an examination of the trends in the business landscape and Department of Defense (DoD) investment to highlight the tension and competing values between the two domains of Industry (supply) and defense (demand). Finally, it suggests some recommendations that should be considered to ensure the defense industry can continue to support the current war requirements while supporting the transformation of the defense department.

STRATEGIC GUIDANCE AND CHANGING WARFARE CONCEPTS

A defense analyst argues that defense policy is explained by a complex set of factors: an assessment of threats, bureaucratic imperatives, macro politics and micro politics. Further, despite some conventional views, defense contractors do not simply call the shots.⁵ In an attempt to examine how this very complex industry is shaped and why it must change, this

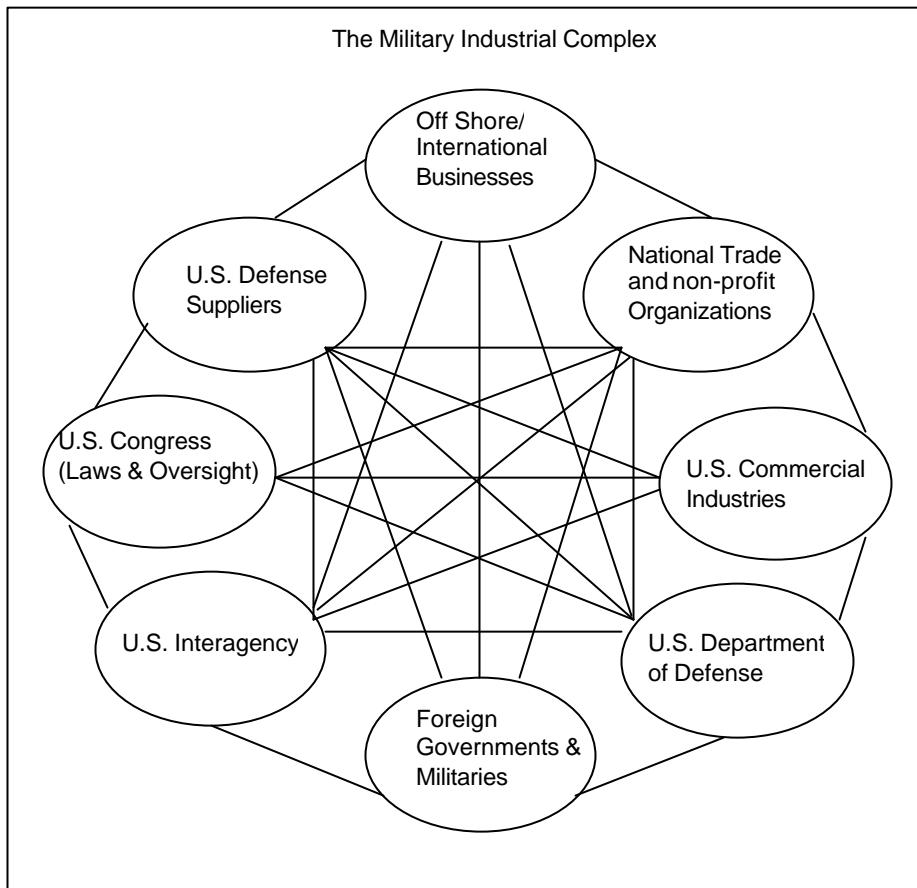


FIGURE 1. THE MILITARY-INDUSTRIAL COMPLEX

paper starts by examining the guidance and direction contained in major national security documents and speeches. One of the drivers that help shape the defense industrial base comes from the President's National Security Strategy. In this strategy, one of the aims of the administration is to transform America's national security institutions to meet the emerging challenges and opportunities.⁶ The NSS points out that the major national security institutions were built in a different era to meet different requirements and that all of them must be transformed.⁷ President Bush has also called for transforming U.S. military forces to better address the challenges of conflict in the 21st century. If this transformation occurs, it will have significant implications for how much DoD invests and what systems it procures.⁸ It will also in turn have significant implications for the industry that will provide these capabilities.

In addition to the President's national direction to transform, the Secretary of Defense establishes strategic guidance that provides goals and objectives for the armed forces of the United States.⁹ These plans and guidance which call for the need to balance transformational innovation with the requirement to deal with current and future threats are described in the *Quadrennial Defense Review Report*, *Annual Report to the President and the Congress*, *Transformation Planning Guidance*, *Future Years Defense Program (FYDP)* and *Joint Operations Concepts*. The defense strategy described in the QDR and *Defense Planning Guidance* sets four DOD policy goals and strategic tenets.¹⁰ One of these key defense strategy tenets is development of a capabilities based joint force. Because the joint functional concepts that describe the capabilities approach to transformational warfighting have implications for the way DoD will do business, it is important to examine these emerging warfare concepts.

The newly published *Joint Operations Concepts* (JOpsC) describes how the U.S. armed forces intend to operate within the next 15 to 20 years.¹¹ While it provides a foundation for development of new capabilities, it also changes the landscape for the companies that will provide the systems to the DoD. JOpsC is a capstone document that describes the attributes and capabilities required by tomorrow's force. The JOpsC guides the development of a family of joint operating concepts, joint functional concepts, joint experimentation, and emerging capabilities.¹²

The Joint Chiefs of Staff have identified five initial functional concept categories: Joint Command and Control (JC2), Battlespace Awareness, Force Application, Focused Logistics, and Protection.¹³ These five functional concept categories are becoming the central theme for decision making in the Pentagon.¹⁴ The Deputy Under Secretary of Defense for Industrial Policy, DUSD(IP), is attempting to align its industrial capabilities assessments to these functional concepts but also acknowledges the evolving nature of these concepts and the need to provide continuous adjustment to the evolving Joint Force concepts.¹⁵ The scope of transformation not only reaches into defense business and warfighting processes but into the way its supporting business partners will support the DoD. The implications of these new operational concepts are that there will be a need for companies to provide systems of systems focus rather than a platform focus. They will need to be integrators of complex, interdependent capabilities rather than service or functional area specific programs.

With the strategic mandate for change having been provided by the President, Secretary of Defense, and the Joint Chiefs, the implications with regard to transforming major American national security institutions are clear. The DUSD(IP) in the *Business Combinations Desk Book* recognizes that warfare concepts are transforming; capabilities are being transformed; and the

defense industry must also transform. Transformational concepts will demand the unique ideas and products of less traditional and potentially smaller companies. The important contributions of these companies will change the future defense industrial landscape.¹⁶ “The Department’s challenge is to match the innovative capabilities of its suppliers with a defense industrial strategy that provides beachheads and bridges – not barriers – to their effective participation.”¹⁷ Ways to set the conditions for increased participation are through flexible laws and adaptive policies, being attentive to organizations, shaping the industrial base, understanding interagency implications, and embracing new joint operations concepts.

SHAPING THE DEFENSE INDUSTRIAL BASE

LAW AND POLICY

U.S. law (10USC Sec.2505) requires the Department to make periodic industrial base assessments and integrate them into overall budget, acquisition, and logistics support decision processes.¹⁸ Congress conducted hearings on these assessments in July 2003 when The Honorable Suzanne D. Patrick reported the defense industrial base in general is healthy, innovative, and responsive; however, the DoD is not as certain about the future and has launched defense industrial base transformation initiatives.¹⁹ Additionally, “Title I of the *Defense Production Act* provides the authorities to mitigate bottlenecks and resolve industrial conflicts by requiring priority performance of identified critical DoD contracts over any other DoD or non-DoD contracts to meet emergent and projected warfighting needs.” Other relevant legislation includes the *Hart-Scott-Rodino Antitrust Improvement Act* and the *Exon-Florio Amendment* to the *Defense Production Act* to allow national security review of proposed mergers and review of foreign acquisitions of U.S. based firms, respectively.²⁰ Additionally, The *Export Administration Act* (EAA) focuses the defense trade regime, but as the National Defense Industrial Association (NDIA) points out, it has not been overhauled since 1988 and is still aimed at thwarting a Cold War threat that no longer exists.²¹

“DoD research, development, and acquisition policies, funding and program decisions, have a major impact on competition and industry transformation.”²² While the DoD has policy established for assessing defense industrial capabilities, is it adequate for addressing today’s challenges? DoD Directive 5000.60, *Defense Industrial Capabilities Assessments* and DoD Directive 5000.60-H, *Assessing Defense Industrial Capabilities* are the primary assessment directives, but both policies were published in April 1996. While the policies’ stated purposes are to ensure industrial capabilities needed to meet current and future national security requirements are available and affordable and to provide the framework and guidelines for

conducting the assessment, they are not comprehensive nor aligned with new DoD transformation goals. These policies only assess capabilities on a case-by-case basis, by separate service. They are program focused and are only used when there is a known or projected problem. Although these policies are nearly eight years old, the DoD organization that is responsible for shaping the industrial base, the office of the DUSD(IP) has been working to address its future.

ORGANIZATIONS SHAPING THE INDUSTRIAL BASE

Within the Department of Defense, Suzanne Patrick heads the Office of the DUSD(IP) and has the responsibility to ensure that the defense industrial base remains viable “to meet current, future, and emergency requirements.”²³ The DUSD(IP) staff has recently taken action to align the review of industrial capabilities with new warfighting concepts and has developed a road map for transforming the defense industrial base as shown in figure 2. DUSD(IP) just published

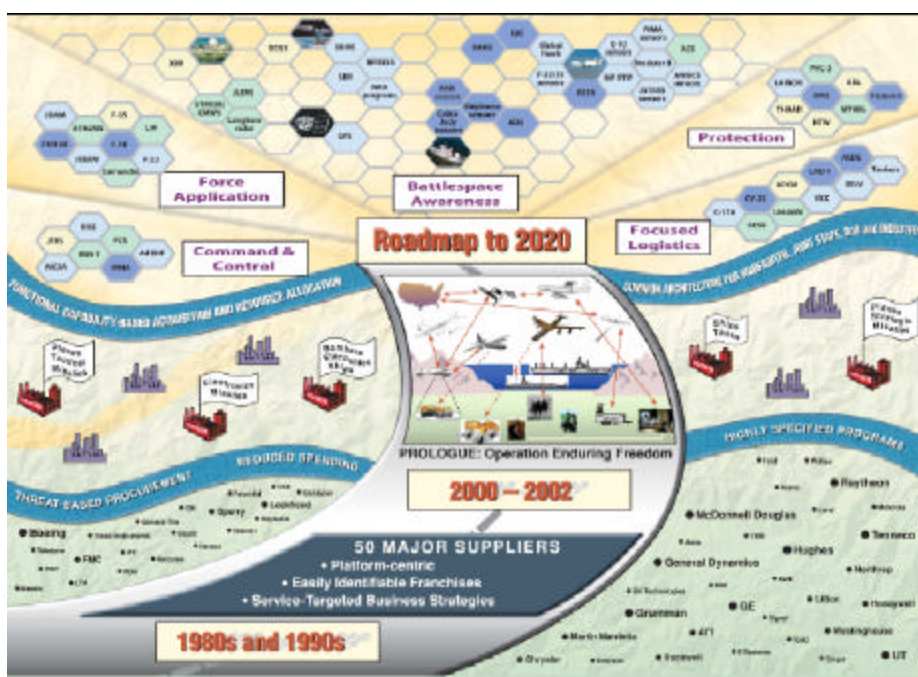


FIGURE 2. TRANSFORMING THE DEFENSE INDUSTRIAL BASE ROADMAP ²⁴

the first of five realigned industrial base capability assessments in January 2004 with an aim to determine which industrial base capabilities are critical to the warfighter. The remaining four assessments will not be completed for 18 months. In a recent speech at an Institutional Investors Conference, Suzanne Patrick stated that it is her aim and hope that by identifying critical capabilities from these assessments that it will help align the defense manufacturing base and future investments with the requirements of the 21st century.²⁵

While Patrick's hope is to influence the defense industry, she recognizes the flexible and self-adaptive nature of the industry. "The defense industrial base is not a planned community. It is what happens when smart, innovative inventors, laboratories, entrepreneurs, and companies find their place in our landscape to deliver capabilities to the warfighter."²⁶ The implications for DoD is that it will not only need to continue to adjust the way it looks at the defense industrial base, but it will also need to ensure that the industry has visibility of that landscape.

Another organization, albeit a nongovernmental entity, that helps shape the industrial base is NDIA which has representation from the entire spectrum of the defense and other related national industries. NDIA has a stated mission to provide a forum to help resolve industrial problems of joint concern. Through their participation in such ventures as publishing *Defense News* and interacting with congress, interested members contribute ideas and recommendations to government and receive helpful information on government policies, programs, and problems. NDIA's top two issues for 2004 include funding America's defense for wartime and transformation and supporting the defense industrial base. NDIA recognizes that the adequacy of a viable U.S. defense industry to provide the warfighting equipment is critical for the ultimate success of the transformational programs of the DoD. They acknowledge Congress expressed concern that the U.S. industrial base is becoming more dependent on foreign sources and that there are fewer American capabilities available for the design and fabrication of critical components, systems, and materials used in military systems. NDIA agrees that the U.S. defense industrial base needs to review and reassess its ability to domestically produce critical items necessary for the timely support of the armed forces.²⁷

INTERAGENCY

The defense department uses another tool, the interagency process, to influence the shape of the defense industrial base by influencing competition and innovation.²⁸ The interagency Committee on Foreign Investment in the United States (CFIUS) manages the Exon-Florio amendment and is chaired by the Department of Treasury. This amendment gives the

President the authority to suspend or block foreign acquisition of U.S. defense contractors when there is a threat to U.S. national security. There are 12 permanent members of the CFIUS which include Departments of Defense, State, Justice, Commerce, Treasury, Homeland Security, the Office of the U.S. Trade Representative, National Security Council, Office of Management and Budget, Office of Science and Technology, Council of Economic Advisors, and the Council on National Economic Policy.²⁹ However, according to the office of Senator Chris Dodd (Dem, CT), "since January 2001, the team has reported no activity. In fact, this team has been stripped of resources and staff."³⁰ DoD must continue to look more closely at reenergizing its use of the interagency process to encourage innovation and to address U.S. competitiveness on the global markets.

ENVIRONMENTAL TRENDS IN INDUSTRY (SUPPLY SIDE)

U.S. based manufacturers are facing a crisis today as significant as the competitiveness crisis of the 1980's—a crisis marked by a steep decline in business investment, a sluggish economy at home and abroad, and sharpened competition from low wage countries.³¹

—National Coalition for Advanced Manufacturing, May 2003

Now that we have looked at some of the laws, organizations, and interagency issues that influence the shape of the defense industrial base, this section of the paper now turns to an examination of developments from the 90's that are having a major impact on the business environment and have implications for assuring national security. These environmental trends include globalization and consolidation and mergers. This section also looks at some examples of recent industry performance in support of Operation Enduring Freedom (OEF) and Operation Iraqi Freedom (OIF). Finally, it provides an overview and some prospects for the future of four critical sectors of the defense industry and introduces the results of the initial capabilities assessment on the Battlespace Awareness (BA) operational concept.

GLOBALIZATION

A review of globalization is necessary to highlight the changes in the world economy which may be rendering many current structures and policies obsolete.³² Thomas Friedman defines globalization as the "inexorable integration of markets, nation-states and technologies to a degree never witnessed before—in a way that is enabling individuals, corporations and nation-states to reach around the world farther, faster, deeper, cheaper than ever before."³³

Globalization has resulted in the increased interdependence of national corporations and even national economies and financial markets.³⁴ Hazel Henderson points out that this globalization

is increasingly abstract and separated from national policy-makers and has triggered new risks.³⁵ In turn, this is driving national governments to pool sovereignty to address global issues like terrorism, set up global standards to address emerging issues such as cloning, or to strengthen internationalization of governing bodies such as the European Union.³⁶

Globalization has the overarching feature of integration, and it is characterized by the interconnectedness with no one being quite in charge.³⁷ The ever-closer interlinkages in the new networked information-based world market are resulting in the acceleration of these global changes.³⁸ However, “the world economy is beginning to adjust to a climate of incessant change, which is reflected in the revolutionary ways in which business organizations and the entire business culture have evolved over the past two decades.”³⁹

One of the challenges of globalization for defense policy makers is that national borders increasingly are irrelevant to how businesses are organized and staffed. Multinational corporations with interlocked corporate boards and production presence in multiple countries present a potential loss of domestic industrial capabilities and an increased interdependence on other countries.⁴⁰ “Our concerns are heightened by growing dependence on global supply chains, and the ease of their disruption at inconvenient times.”⁴¹

On the other hand, it appears to be fair game for U.S. companies to use foreign military sales (FMS) as an important role in supporting the U.S. industrial base. For example, current production lines for many critical Army systems are almost solely devoted to FMS, keeping the potential industrial base warm. “For every \$1 billion dollars in sales, about 22,000 U.S. jobs are created or sustained. The FMS impact on the U.S. industrial base includes both direct and indirect benefits.”⁴²

The implications of globalization are not crystallized. Globalization is not a frozen process, but it is an ongoing dynamic process.⁴³ Friedman points out it will take a long time to get our minds around it. He says we know about the globalization system and how it will work about as much as we knew about how the cold war system was going to work back in 1946.⁴⁴ One sure thing is that the U.S. will become more interdependent with foreign entities and will have to find an appropriate balance among several competing values associated with national security, maintaining competitiveness, and playing fair with our trading partners.

CONSOLIDATIONS

Prior to World War II, there was no large defense industrial base, and the U.S. relied primarily on government facilities to produce its weapon systems. The term, “military-industrial complex,” did not even come into being until President Eisenhower coined the term during his

1961 farewell address to the nation. Prior to 1939, the U.S. did not have a large, enduring, standing army, there was no need for a large supporting industry. It was only after the onset of the Cold War and the new national strategy to maintain a permanent national war footing that the defense-unique industries emerged.⁴⁵

This military-industrial complex has served the nation well. The drawdown of the 90's brought a reduced demand for weapon systems; hence, consolidations through acquisitions and mergers became an attractive option for the defense industry.⁴⁶ Each year U.S. companies are involved with thousands of mergers and acquisitions.⁴⁷ "What were roughly 50 major defense suppliers in the 1980's have become five major, highly consolidated, cross-Service, cross-platform contractors."⁴⁸ "Since 1994, the Department has reviewed over 230 mergers or acquisitions of U.S. defense companies. In this Administration, nearly 90 such transactions have been reviewed with a value over nearly \$80 billion. Interestingly, 2003 was a year marked by a statistically higher number of transactions—37 so far against a ten-year annual average of 23."⁴⁹ For now, these companies appear to be uniquely postured to provide system-of-system approaches to defense requirements.⁵⁰ As Suzanne Patrick states:

With regard to foreign acquisitions of U.S. defense companies, there appears to be a misperception that this administration has closed the door to transnational consolidation. Nothing could be further from the truth. Since 1988, 1,450 transactions in the defense industrial base have involved a foreign buyer—or about 90 a year. The number of transactions began trailing downward in 1999 and 2000—with about 75 in each of those years. In the three years of this administration, about 150 transactions have been reviewed at a value of about \$15 billion. Eighty were approved; six were withdrawn; one required divestiture and network security agreement; and the balance were approved with remedies or other agreements to mitigate the Department's concerns.⁵¹

DoD has been supportive of the consolidation process, because it enables firms to eliminate excess capacity, reduce costs, and provide better value for DoD. Business combinations may allow established firms to assimilate non-traditional, innovative companies and allows smaller emerging firms to capitalize on the larger firm's resources.⁵² The rigorous policies for review of the mergers and acquisitions in the U.S. are less restrictive than other countries, yet they seek to ensure competitiveness for affordable and innovative capabilities and flexibility to meet national security requirements.⁵³ Patrick affirms, "In spite of what some may consider excessive consolidation in the defense industrial base, it is this vibrancy in emerging defense suppliers that makes us so confident that the composition of the defense industrial base will change by growing in the next decade."⁵⁴

INDUSTRY SUPPORT DURING WAR

How did the defense industry perform during the most recent conflicts? The answers vary somewhat and depend on who is commenting and when the comments are made. However, the Pentagon has confidence that immediate needs can be adequately satisfied by the U.S. defense industry. While Patrick rightly points out that OEF/IF did not require the widespread surge of the defense industrial base as the United States had done in World War II, in a recent speech, she touted the flexibility and adaptability of the defense industrial base. She went on to say that the DUSD(IP) staff quietly processed more than two dozen priority changes to provide urgently needed equipment in support of OEF/IF including items like Multispectral Targeting Arrays for unmanned aerial vehicles, anti-ballistic Spectra Shield plates, laser guided bombs, and joint direct attack munitions (JDAM).⁵⁵ She also pointed out examples of global industrial base contributions during OIF such as the French firm Deschamps providing critical landing mats to reduce helicopter hard landings; a Japanese company producing Joint Service Lightweight Integrated Suit Technology (JLIST) chemical protection suits with a German design; and European Aeronautic Defence and Space Company's (EADS) Manching facility providing F-18 repair parts in five days. Reportedly, it would have taken a U.S. company two months to return the F-18 to combat.⁵⁶ While these were all listed as examples of the great flexibility of the global industrial base, others view them as potential liabilities.

In Sept 2003, the *Washington Post* reported that as many as one third of the Bradley Fighting Vehicles patrolling the "Sunni Triangle" were out of commission because of the high unexpected operational tempo. Normally, a Bradley gets new treads once a year or after 800 miles, but especially due to escort missions, the Bradleys in Iraq were running 1200 miles in one month. The Goodyear Tire and Rubber Company ramped up new track production and even after the Red River Army Depot went to three shifts a day, seven days a week rebuilding old tracks, supply levels were still three months behind Army demands.⁵⁷ In a survey of recent articles, other problems existed where reliance on foreign companies delayed critical components during OEF/IF. In one example, the Swiss government refused to sell a unique propellant for the 25mm armor piercing round to a U.S. firm because of disagreements with U.S. policy in Iraq. While this situation was resolved and did not impact combat operations, it highlights the potential problems of foreign governments refusing to export critical weapon system components that are needed in the production of weapon systems but are not produced in the U.S.⁵⁸

There are many other examples. Linters, an indispensable material in ammunition production, now have to be purchased from Germany because the only U.S. supplier could not

stay in business due to low demand. Representative Duncan Hunter and others question the United States' ability to meet defense requirements in other areas to include mortar fuses, tungsten, and beryllium. LtGen (USAF, Ret) Lawrence Farrell points out while the defense department is convinced there is not a crisis yet, there is a decline in U.S. manufacturing capabilities particularly in the ability to manufacture sophisticated components for weapon systems. Farrell, now President and Chief Executive Officer of NDIA, contends we are losing ground to Japan, Germany, and China, and the U.S. cannot get to the point where American companies cannot manufacture critical items that the military services require for their weapon systems.⁵⁹

STATE OF CRITICAL SECTORS AND PROSPECTS FOR THE FUTURE

The Industrial College of the Armed Forces (ICAF) conducts annual industry studies and has chronicled the state of the U.S. defense industry. This section reviews four sectors studied by ICAF: Aircraft, Land Combat Systems, Shipbuilding, and Information Technology. This section then reviews the first of five DUSD(IP) assessments (Battlespace Awareness) conducted in 2003 and based on a new structured top-down analysis and policy framework that is aligned with and addresses critical warfighting capabilities.⁶⁰

Aircraft

The U.S. aircraft industry is one of the essential foundations of the economic, political, and military elements of U.S. national power. After the tragic events of September 11, 2003, the industry's vitality was significantly diminished. Although the industry has been forced to look for new markets as worldwide aircraft sales have dropped, it still leads U.S. business exports.⁶¹ "Because the U.S. national security depends so heavily on this industry, the U.S. government provided support to weakened sectors – notably, the commercial air transport sector – that helped forestall a grave diminution of capability. Given these circumstances, and without cooperative strategic planning by public and private organizations, the aircraft industry faces an uncertain future."⁶²

Land Combat Systems

During the 1990s, when defense budgets declined and demand for ground systems dropped, the U.S. land combat systems (LCS) industry went through a challenging period of consolidation. Increasingly, partnerships have been formed between and among domestic and foreign LCS firms to maximize cash flow as well as share the risks and rewards of program development. In this regard, the worldwide LCS industry is keeping a close eye on the U.S.

Army's transformation efforts as these firms seek to capitalize on this potentially lucrative initiative. The future requires that LCS firms become even more flexible and adaptable and will result in reexamination of core capabilities.⁶³ "While 'metal bending' knowledge is still important, the industry's future prime contractors will be lead system integrators who are able to deal with increasingly complex platforms and system-of-systems."⁶⁴ Because, the U.S. LCS industry is going to be critical to meeting U.S. national security needs, close government involvement will be required for the foreseeable future. Dilemmas faced by such stewardship include deciding on the degree of foreign participation allowed and weighing LCS firms' implementation of economical, lean manufacturing techniques against the nation's need for surge production in the event of emergencies. Although the LCS industry faces challenges in the next several years, its opportunities for growth appear to remain significant.⁶⁵

Shipbuilding

While the U.S. remains uncompetitive in the production of large commercial vessels, the U.S. produces the best military warships in the world. The study goes on to say that even though military warship construction is an essential element of the U.S. strategy, the lack of a viable commercial shipbuilding industry does not directly impact this strategy. However, the cost of maintaining excess military shipbuilding and repair capacity and the costs associated with maintaining a non-competitive commercial shipbuilding industry do impose increasingly high opportunity costs on national security resources.⁶⁶

Information Technology

The ICAF information technology (IT) industry study recognizes both the vital importance and vulnerability that IT represents for the U.S.⁶⁷ "The IT industry fuels the information revolution that is transforming the U.S. economy while significantly altering social interactions, domestic and international political relationships, and military capabilities. IT serves as a catalyst for innovation, communication, economic growth, and political and economic liberalization everywhere that it is embraced."⁶⁸ This growing reliance on IT creates a vulnerability that cannot be addressed separately by government and the private sector. The study goes on to suggest the U.S. must correct this vulnerability and maintain world leadership in the IT industry to maintain a competitive advantage for the U.S. across all instruments of national power.⁶⁹

Battlespace Awareness

The initial DUSD(IP) assessment of the industrial base supporting an emerging U.S. military concept of Battlespace Awareness (BA) had encouraging results. BA provides the capabilities to see and understand the environment and the adversaries they face.⁷⁰ “BA supplies the critical knowledge necessary to precisely apply force, to thwart or circumvent enemy efforts, and to bring the right support to the right place at the right time.”⁷¹ Over 200 companies, which range in size from six to tens of thousands of employees and millions to billions of dollars of revenue, provide essential building blocks toward BA capability. Consolidation is not a concern with this range of companies that includes international participants.⁷² The assessment provides recommended remedies for the industrial capabilities that need attention, to include a combination of funding and acquisition and external policy changes.⁷³

Is the industrial base up to the challenges of the current wartime requirements of the DoD? According to a review of recent assessments, the answer is yes. Can it support transformation and DoD’s future requirements? According to recent DoD studies and leaders in defense industry, the answer is less clear. Kent Kresa, chief executive officer of Northrup Grummond Corporation suggests that the DoD must overhaul old outdated regulations and ensure intellectual property rights are protected in order to attract innovative companies into the defense sector. Kresa points out that military priorities like chemical-biological defense, cyber-warfare and the high-speed communications requirements will not be entirely provided by traditional large defense companies, and defense industry and government must find ways to attract participation of smaller and non-traditional companies to provide future solutions.⁷⁴ The National Coalition for Advanced Manufacturing (NACFAM)’s Advanced Manufacturing Leadership Council believes the U.S. manufacturing base can deal with the challenges by accelerating transformation of industrial capabilities. Through the use of technologies and processes that enable “mass customization,” industry will shift their way of thinking from one of supply “push” to one of demand “pull” which increases manufacturers’ global competitiveness by meeting a variety of needs at low cost and high quality.⁷⁵ Leo Reddy, NACFAM’s CEO, said the defense industry “needs to move away from the image of taking 15 years to come up with a new system and experiencing massive cost overruns while being more responsive to customer needs.” He asserted that while progress has been made on this front by the industry through the adoption of lean business practices, process improvements and better manufacturing resource planning, there is still room for improvement.⁷⁶

TRENDS IN DOD (DEMAND SIDE)

While industry has taken measures to transform their performance to meet government demand, address new warfighting concepts, and are investing properly, the government will play a large role in providing an enabling environment to allow firms to compete while providing a secure defense industrial base. As previously discussed, the DoD wartime demand has been adequately met with only a few priorities changed. This section of the paper looks into implications DoD as a customer. It also provides analysis of investment funding to highlight significant implications on transformation plans and on the defense industrial base's ability to produce DoD's future systems.

DOD AS A CUSTOMER

Is it a good assumption for the defense industry to expect DoD to be a good, reliable, customer with stable funding? The old hats in this sector recognize that unstable programs create an uncertain workforce, higher unit costs, and raises risk for the government and industry.⁷⁷ For example, before the V-22 Osprey had two fatal accidents, the manufacturer was planning to build 20 aircraft in one year. Instead, the production has now been split over two years, so the Bell-Boeing venture has been producing no more than 11 aircraft per year over a nine year period. When the budget process recently resulted in a jump from 11 V-22's in FY 05 to 20 in FY06, a significant ramp-up poses challenges to Bell-Boeing.⁷⁸ If the government were to provide adequate and stable funding on programs, it would instill confidence in its suppliers followed by increased investment along with great ideas on how to save money.⁷⁹ Additionally, the DoD has been actively implementing change in the requirements generation and materiel acquisition processes. As these processes and the defense industrial base evolve, the involvement of all participants will be necessary to ensure that the industrial base continues to optimally serve the warfighter.⁸⁰ Despite these positive changes, more can be done by DoD to influence and eliminate the prospects found in this commentary.

It is a sorry commentary on the prospects of our defense industrial base that so many of our nation's industrial and corporate powerhouses don't want to do business with the defense department. Their reasons are numerous. Contract competition risks, volume distribution spread over too many years, funding delays and uncertainties, onerous accounting requirements, intellectual property rights, and many more.⁸¹

— Edward C. Aldridge Jr.
A Healthy Industrial Base, 30 January, 2002

INVESTMENT TRENDS, PROJECTIONS, AND IMPLICATIONS

According to a 2003 Congressional Budget Office (CBO) study, in order to achieve complex transformational results, procurement budgets would, in many cases, have to match or exceed the levels seen during the defense buildup of the 1980's.⁸² We now turn to an examination of those spending levels. In January 2003, the CBO prepared a report to examine the long term implications of the current defense plans on resources and forces. Defense is the second largest federal budget item behind Social Security, but defense is the single biggest category of discretionary spending. The investment portion of that funding buys the development and procurement of new and modified equipment."⁸³

Defense budgets stress the importance of shifting forces from traditional approaches to new transformational approaches that incorporate advanced technologies. As a consequence, the Bush Administration plans to initiate or increase funding for programs such as space-based radar satellites, unmanned combat air vehicles, unmanned reconnaissance aircraft, small surface combatants for the Navy, advanced technology combat vehicles for the Army, and precision munitions. Nevertheless, the Administration's 2003 plans would still continue to fund nearly all of the major acquisition programs inherited from the Clinton Administration (except the Army's Crusader self-propelled howitzer program, which was terminated). CBO asserts the "2003 Future Years Defense Program incorporated no significant changes over the next five years to the military's force structure—the number and composition of Army divisions, Air Force tactical fighter wings, Marine Corps expeditionary brigades, and Navy carrier battle groups."⁸⁴ DoD may be able to make transformational changes at some point, but programs begun now are unlikely to provide operational capabilities for 10 to 15 years, if not longer. CBO projections forecast that transformation is unlikely to be realized before the 2020.⁸⁵

In February 2004, a defense department press release on the fiscal year (FY) 2005 budget affirmed that current

operations in Iraq, Afghanistan, and the global war on terrorism have reinforced the importance of transforming U.S. military capabilities, and the FY 2005 budget continues the president's strong commitment to defense transformation and force modernization. This transformation and other acquisition of new capabilities are funded in the appropriation titles of research, development, test, and evaluation (RDT&E) and procurement. The fiscal 2005 request is: \$74.9 billion for procurement – up from \$60 billion in fiscal 2001. \$68.9 billion for RDT&E – up from \$41 billion in fiscal 2001.⁸⁶

While this funding increase will help in the short term, budget pressures from continued growth in the military's operations costs as well as from social security and Medicare might make it difficult to sustain those levels of investment spending.⁸⁷ NDIA has made adequate

funding a top issue, because failure to provide adequate investment funds could result in a lack in capacity to design, develop, and produce future weapons.⁸⁸

RECOMMENDATIONS

The recommendations below center around setting conditions that encourage defense industry innovativeness and flexibility to meet the very complex national security requirements of the 21st century. By recognizing that the defense department will not be necessarily capable of anticipating the operational tempo demands of future operations, and also understanding the department cannot afford structuring for the worst case scenario, DoD and industry still must be able to respond as partners.⁸⁹ The defense department, Congress, President, and the entire military industrial complex must seek the relationships, structures, laws, policies, funding, and acquisition strategies to promote competition, innovation, and flexibility needed to position the defense industry to provide the transformational capabilities of the future force. The DoD must also continue to look more closely at reenergizing the interagency process not only to influence competition and innovation but to jumpstart the dialogue and priority of global competitiveness.⁹⁰ Finally, DoD needs to revamp its outdated assessment policies and tools to keep a dynamic pulse of the defense industry. There is little doubt that with continued joint sponsored experimentation, the joint operating concepts will continue to evolve. While the DUSD(IP) has started to align the ongoing industrial capability assessments with the new vernacular of the JOpsC, the assessments are not expected to be completed until sometime in 2005 and should be accelerated.

CONCLUSIONS

This paper has analyzed the ability of the defense industrial base to support the U.S. national security demands of the 21st century. It also made several recommendations to provide a landscape that would encourage flexible, adaptive companies to participate in the defense industrial base that can provide innovative solutions to support current and future operations. The world is changing, and the nature and range of military operations is also changing. While it will take years to fully grasp the implications of these rapid changes and increased complexity, it is clear that DoD needs to continue developing more sophisticated ways to look at and shape the defense industrial base. The President, Congress, defense department and the U.S. portion of the entire military industrial complex have all recognized the mandate for change. However, with competing demands of constrained modernization budgets, increased military operations tempo, heightened global competition, and a consolidated defense industrial structure, the defense department must find ways to access an ever increasing integrated and interdependent

global industrial base. The defense department must set the competitive conditions to accelerate the defense industrial base transformation to provide innovative and affordable capabilities for the nation at war while transforming.

WORD COUNT= 6059

ENDNOTES

¹ E.C. Aldridge, "Five Goals," 4 February 2002; available from <http://www.acq.osd.mil/usd/new_speeches/goalsusmc.doc>; Internet; accessed 30 January 2004.

² Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, (Washington D.C.:U.S. Deputy Under Secretary of Defense for Industrial Policy, September 2003), 1.

³ Ibid.

⁴ Department of Defense, *Defense Federal Acquisition Regulations Supplement*, (Washington D.C.: U.S. Department of Defense, April 2003), subpart 208.72; available from <http://www.acq.osd.mil/dpap/dfars/pdf/r20040223/208_72.pdf>; Internet; accessed 4 March 2004.

⁵ Stan Crock, "An Arms Industry Too Big for the Task at Hand," *The Washington Post*, 31 August 2003, sec. 1B, p. 2.

⁶ Joint Chiefs of Staff. *Joint Operations Concepts*, (Washington, D.C.:U.S. Joint Chiefs of Staff, November 2003), 6.

⁷ George W. Bush, *The National Security Strategy of the United States of America* (Washington D.C.: The White House, September 2002), 29.

⁸ U.S. Congressional Budget Office, *The Long-Term Implications of Current Defense Plans*, January 2003 (Washington D.C.: U.S. Congressional Budget Office, 2003), 1.

⁹ Joint Operations Concepts, 6.

¹⁰ Ibid.

¹¹ Ibid., 3.

¹² U.S. Joint Chiefs of Staff, *Draft Functional Concept for Battlespace Awareness*, (Washington, D.C.: U.S. Joint Chiefs of Staff, 31 October 2003), 1.

¹³ Joint Chiefs of Staff. *Joint Operations Concepts*, (Washington, D.C.:U.S. Joint Chiefs of Staff, November 2003), 19.

¹⁴ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness* (Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), January 2004), ii.

¹⁵ Ibid.

¹⁶ Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, (Washington D.C.:U.S. Deputy Under Secretary of Defense for Industrial Policy, September 2003), 1.

¹⁷ Ibid.

¹⁸ Deputy Under Secretary of Defense for Industrial Policy, "Frequently Asked Questions," available from <<http://www.acq.osd.mil/ip/faq.html>>; Internet; accessed 30 January 2004.

¹⁹ Suzanne D. Patrick, "Saving the Defense Industrial Base," Prepared Remarks for the House Committee on Small Business 9 July 2003; available from <<http://gopher.house.gov/smbiz/hearings/108th/2003/030709/patrick.html>>; Internet; accessed 13 Dec 2003.

²⁰ Deputy Under Secretary of Defense for Industrial Policy, "Frequently Asked Questions," available from <<http://www.acq.osd.mil/ip/faq.html>>; Internet; accessed 30 January 2004.

²¹ National Defense Industrial Association, "2004 Top Issues," available from <http://www.ndia.org/Content/NavigationMenu/Advocacy/Policy/PDFs28/2004_NDIA_Top_Issues.pdf>; Internet; accessed 28 February 2004.

²² Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, 1.

²³ Deputy Under Secretary of Defense for Industrial Policy, "DUSD(IP) web site," available from <<http://www.acq.osd.mil/ip/>>; Internet; accessed 24 January 2004.

²⁴ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness* (Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), January 2004), 8.

²⁵ Suzanne D. Patrick, Remarks of Deputy Under Secretary of Defense for Industrial Policy, Aerospace, Defense and Government IT Services Institutional Investors Conference, New York, 3 December 2003, available from <http://www.acq.osd.mil/ip/speeches/institutional_investors_conf_12-3-03.pdf>; Internet; accessed 24 January 2004.

²⁶ Suzanne D. Patrick, Remarks of Deputy Under Secretary of Defense for Industrial Policy, Navy Gold Coast Conference, Ventura, 7 October 2003. Available from <http://www.acq.osd.mil/ip/speeches/navy_gold_coast_conference_10-07-03.pdf>; Internet; accessed 24 January 2004.

²⁷ National Defense Industrial Association, "2004 Top Issues," available from <http://www.ndia.org/Content/NavigationMenu/Advocacy/Policy/PDFs28/2004_NDIA_Top_Issues.pdf>; Internet; accessed 28 February 2004.

²⁸ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, 35.

²⁹ Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, 16.

³⁰ "House Passes 5-Year DPA Extension; Seeks Offsets Report," *Defense Daily*, 17 October 2003, 1 [database on-line]; available from ProQuest; accessed 7 November 2003.

³¹ National Coalition for Advanced Manufacturing, "Industrial Transformation: Key to Sustaining the Productivity Boom," May 2003 available from <<http://www.nacfam.org/index.htm>>; Internet; accessed 4 March 2004.

³² Hazel Henderson, *Beyond Globalization* (West Hartford: Kumarian Press, Inc., 1999), 21.

³³ Thomas L. Friedman, *The Lexus and the Olive Tree* (New York: Anchor Books, 2000), 9.

³⁴ Henderson, 1.

³⁵ Ibid. 2.

³⁶ Ibid.

³⁷ Friedman, 8.

³⁸ Henderson, 21.

³⁹ Kip P. Nygren, "Emerging Technologies and Exponential Change: Implications for Army Transformation," *Parameters* Summer 2002 [journal on-line]; available from <<http://www.carlisle.army.mil/usawc/Parameters/02summer/nygren.htm>>; Internet; accessed 28 February 2004.

⁴⁰ Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, 2.

⁴¹ "House Small Business Chair Wants Discussion on U.S. Defense Industrial Base," *Defense Daily*, 16 September 2003, 1 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁴² AUSA web site, available from <<http://www.ausa.org/ilw>>; Internet; accessed on 24 January 2004.

⁴³ Friedman, 9.

⁴⁴ Friedman, 15.

⁴⁵ Stan Crock, "An Arms Industry Too Big for the Task at Hand," *The Washington Post*, 31 August 2003, sec. 1B, p. 2.

⁴⁶ Robert E. Hamm Jr., *U.S. Defense Industrial Readiness: Getting it Right in the 21st Century*, Strategy Research Project (Carlisle Barracks: U.S. Army War College, April 2003), 5.

⁴⁷ Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, 21.

⁴⁸ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, ii.

⁴⁹ Suzanne D. Patrick, Remarks of Deputy Under Secretary of Defense for Industrial Policy, Aerospace, Defense and Government IT Services Institutional Investors Conference, New York,

3 December 2003. Available from
<http://www.acq.osd.mil/ip/speeches/institutional_investors_conf_12-3-03.pdf>; Internet;
accessed 24 January 2004.

⁵⁰ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, ii.

⁵¹ Suzanne D. Patrick, Remarks of Deputy Under Secretary of Defense for Industrial Policy, Aerospace, Defense and Government IT Services Institutional Investors Conference, New York, 3 December 2003. Available from
<http://www.acq.osd.mil/ip/speeches/institutional_investors_conf_12-3-03.pdf>; Internet;
accessed 24 January 2004.

⁵² Deputy Under Secretary of Defense for Industrial Policy, *Business Combinations Desk Book*, 21.

⁵³ Ibid.

⁵⁴ Suzanne D. Patrick, Remarks of Deputy Under Secretary of Defense for Industrial Policy, Aerospace, Defense and Government IT Services Institutional Investors Conference, New York, 3 December 2003. Available from
<http://www.acq.osd.mil/ip/speeches/institutional_investors_conf_12-3-03.pdf>; Internet;
accessed 24 January 2004.

⁵⁵ Ibid.

⁵⁶ Ibid.

⁵⁷ Jonathan Weisman and Renae Merle, "Wearing Out and Adding Up; Army Costs Increase as Terrain Takes Toll on Equipment," *The Washington Post*, 13 September 2003, sec A, p. 01 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁵⁸ Lawrence P. Farrell Jr., "U.S. Must Resolve Industrial Base Issues," *National Defense* 87 (June 2003): 4 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁵⁹ Lawrence P. Farrell, Jr., "State of Manufacturing Base Is Cause for Concern," available from <http://www.ndia.org/Content/NavigationMenu/Resources1/Presidents_Corner2/Presidents_Corner.htm>; Internet; accessed 28 February 2004.

⁶⁰ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, 47.

⁶¹ Industrial College of the Armed Forces, "Aircraft," Industrial College of the Armed Forces Industry Studies 2002; <<http://www.ndu.edu/ica/industry/IS2002/2002%20Aircraft.htm>>; Internet; accessed 12 December 2003.

⁶² Ibid.

⁶³ Industrial College of the Armed Forces, "Land Combat Systems," Industrial College of the Armed Forces Industry Studies 2002;

<<http://www.ndu.edu/ica/industry/IS2002/2002%20land%20combat%20systems.htm>>; Internet; accessed 12 December 2003.

⁶⁴ Ibid.

⁶⁵ Ibid.

⁶⁶ Industrial College of the Armed Forces, "Shipbuilding," Industrial College of the Armed Forces Industry Studies 2002;
<<http://www.ndu.edu/ica/industry/IS2002/2002%20shipbuilding%20paper%revised6.htm>>; Internet; accessed 12 December 2003.

⁶⁷ Industrial College of the Armed Forces, "Information Technology," Industrial College of the Armed Forces Industry Studies 2002;
<<http://www.ndu.edu/ica/industry/IS2002/2002%20Information%20Technology.htm>>; Internet; accessed 12 December 2003.

⁶⁸ Ibid.

⁶⁹ Ibid.

⁷⁰ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, 2.

⁷¹ Ibid.

⁷² Ibid, 47.

⁷³ Ibid, 3.

⁷⁴ Erwin and Sandra, "Military Transformation Requires New Suppliers," *National Defense*, March 2003, Vol. 87, Iss. 592: 38 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁷⁵ National Coalition for Advanced Manufacturing, "Industrial Transformation: Key to Sustaining the Productivity Boom," May 2003 available from
<<http://www.nacfam.org/index.htm>>; Internet; accessed 4 March 2004.

⁷⁶ Calvin Biesecker, "Industry Group Wants Transformed Industrial Base to Boost Productivity," *Defense Daily*, 19 June 2003, 1 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁷⁷ Hunter Keeter, "Osprey Industrial Base Faces Challenges," *Defense Daily*, 24 June 2003, 1 [database on-line]; available from ProQuest; accessed 7 November 2003.

⁷⁸ Ibid.

⁷⁹ Ibid.

⁸⁰ Deputy Under Secretary of Defense (Industrial Policy), *Defense Industrial Base Capabilities Study: Battlespace Awareness*, ix.

⁸¹ Edward C. Aldridge, "A Healthy Industrial Base," 30 January 2002; available from <http://www.acq.osd.mil/usd/new_speeches/antelope.doc>; Internet; accessed 30 January 2004.

⁸² U.S. Congressional Budget Office, *The Long-Term Implications of Current Defense Plans*, January 2003 (Washington D.C.: U.S. Congressional Budget Office, 2003), xix.

⁸³ *Ibid.*, 3.

⁸⁴ *Ibid.*, 4.

⁸⁵ *Ibid.*

⁸⁶ Department of Defense, "Defense Department Announces 2005 Budget Request," 23 January 2004; News Release available from <<http://www.defenselink.mil/releases/2004/nr20040123-0263.html>>; Internet; accessed 28 February 2004.

⁸⁷ CBO, xix.

⁸⁸ Benjamin Stone, "NDIA Lists Top Defense Issues for 2003," *National Defense*, March 2003 [journal on-line]; available from <<http://www.nationaldefensemagazine.org/article.cfm?id=1058>>; Internet; accessed 3 November 2003.

⁸⁹ Industrial College of the Armed Forces, "Strategic Supply," Industrial College of the Armed Forces Industry Studies 2002; available from <<http://www.ndu.edu/ica/industry/IS2002/2002%20Strategicsupply.htm>>; Internet; accessed 12 December 2003.

⁹⁰ Calvin Biesecker, "Industry Group Wants Transformed Industrial Base to Boost Productivity," *Defense Daily*, 19 June 2003, 1 [database on-line]; available from ProQuest; accessed 7 November 2003.

BIBLIOGRAPHY

- Aldridge, Edward C. *Five Goals*. Available from <http://www.acq.osd.mil/usd/new_speeches/goalsusmc.doc>. Internet. Accessed 30 January 2004.
- AUSA web site. Available from <<http://www.ausa.org/ilw>>. Internet. Accessed on 24 January 2004.
- Bialos, Jeffrey. "Last Supper Fallout." Defense News November 2003. Journal on-line. Available from <<http://www.defensenews.com/channel.php?C=commentary>>. Internet. Accessed 3 November 2003.
- Biesecker, Calvin. "Industry Group Wants Transformed Industrial Base to Boost Productivity." *Defense Daily* 218, no.57 (19 June 2003):1. Database on-line. Available from ProQuest. Accessed 7 November 2003
- Bush, George W. *The National Security Strategy of the United States of America*. Washington, D.C.: The White House, September 2002.
- Crock, Stan. "An Arms Industry Too Big for the Task at Hand." *The Washington Post*, 31 August 2003, sec. 1B, p.1-2.
- Defense Daily. "House Passes 5-Year DPA Extension; Seeks Offsets Report." *Defense Daily* (17 October 2003): 1. Database on-line. Available from ProQuest. Accessed 7 November 2003.
- Defense Daily. "House Small Business Chair Wants Discussion on U.S. Defense Industrial Base." *Defense Daily* (16 September 2003): 1. Database on-line. Available from ProQuest. Accessed 7 November 2003.
- Erwin and Sandra. "Military Transformation Requires New Suppliers." *National Defense* (March 2003): Vol. 87, Iss. 592: 38. Database on-line. Available from ProQuest. Accessed 7 November 2003.
- Farrell, Lawrence P. Jr. "State of Manufacturing Base Is Cause for Concern." Available from <http://www.ndia.org/Content/NavigationMenu/Resources1/Presidents_Corner2/Presidents_Corner.htm>. Internet. Accessed 28 February 2004.
- Farrell, Lawrence P. Jr. "U.S. Must Resolve Industrial Base Issues." *National Defense* 87 (June 2003): 4. Database on-line. Available from ProQuest. Accessed 7 November 2003.
- Friedman, Thomas L. *The Lexus and the Olive Tree*. New York: Anchor Books, 2000.
- Hamm, Robert E. Jr. *U.S. Defense Industrial Readiness; Getting it Right in the 21st Century*. Strategy Research Project. Carlisle Barracks: U.S. Army War College, April 2003.
- Hatch, Mary Jo. *Organization Theory*. Oxford: University Press, 1997.
- Henderson, Hazel. *Beyond Globalization*. West Hartford: Kumarian Press, Inc., 1999, 21.

- Keeter, Hunter. "Osprey Industrial Base Faces Challenges." *Defense Daily* (24 June 2003): 1. Database on-line. Available from ProQuest. Accessed 7 November 2003.
- Laird, Robbin F. "Transformation and the Defense Industrial Base: A New Model." *Defense Horizons* 26 (May 2003): 1-8.
- Linster, Bruce G., Stephen Slate, Robert L. Waller. "Consolidation of the U.S. Industrial Base: Impact on Research and Expenditures." *Acquisition Review Quarterly* (Spring 2002): 143-150.
- Minami, Wayde. "When Purchasing Bombs and Jets, Buy American is Insurance Policy." *Air Force Times*, 28 July 2003, p.54.
- National Coalition for Advanced Manufacturing. "Industrial Transformation: Key to Sustaining the Productivity Boom." May 2003 available from <<http://www.nacfam.org/index.htm>>; Internet; accessed 4 March 2004.
- National Defense Industrial Association. "2004 Top Issues." Available from <http://www.ndia.org/Content/NavigationMenu/Advocacy/Policy/PDFs28/2004_NDIA_Top_Issues.pdf>; Internet; accessed 28 February 2004.
- Nygren, Kip P., "Emerging Technologies and Exponential Change: Implications for Army Transformation." *Parameters* Summer 2002. Journal on-line. Available from <<http://www.carlisle.army.mil/usawc/Parameters/02summer/nygren.htm>>. Internet. Accessed 28 February 2004.
- Patrick, Suzanne D., Deputy Under Secretary of Defense (Industrial Policy). *Saving the Defense Industrial Base*. Prepared Remarks for the House Committee on Small Business. 9 July 2003. Available from <<http://gopher.house.gov/smbiz/hearings/108th/2003/030709/patrick.html>>. Internet. Accessed 13 December 2003.
- Patrick, Suzanne D., Deputy Under Secretary of Defense (Industrial Policy). Aerospace, Defense and Government IT Services Institutional Investors Conference Remarks. 3 December 2003. Available from <http://www.acq.osd.mil/ip/speeches/institutional_investors_conf_12-3-03.pdf>. Internet. Accessed 24 January 2004.
- Patrick, Suzanne D., Deputy Under Secretary of Defense (Industrial Policy). Navy Gold Coast Conference Remarks. 7 October 2003. Available from <http://www.acq.osd.mil/ip/speeches/navy_gold_coast_conference_10-07-03.pdf>. Internet. Accessed 24 January 2004.
- Stone, Benjamin. "NDIA Lists Top Defense Issues for 2003." *National Defense* March 2003. Journal on-line. Available from <<http://www.nationaldefensemagazine.org/article.cfm?id=1058>>. Internet. Accessed 3 November 2003.
- U.S. Congressional Budget Office. *The Long-Term Implications of Current Defense Plans*. Washington D.C.: U.S. Congressional Budget Office, January 2003.

- U.S. Department of Defense. *Defense Department Announces 2005 Budget Request*. Press Release. 23 January 2004. Available from <<http://www.defenselink.mil/releases/2004/nr20040123-0263.html>>. Internet. Accessed 28 February 2004.
- U.S. Department of Defense. *Defense Federal Acquisition Regulations Supplement*. Washington D.C.: U.S. Department of Defense, April 2003, subpart 208.72; available from <http://www.acq.osd.mil/dpap/dfars/pdf/r20040223/208_72.pdf>. Internet. Accessed 4 March 2004.
- U.S. Department of Defense. *Impact of Mergers or Acquisitions of Major DoD Suppliers on DoD Programs*. DoD Directive 5000.62. Washington D.C.: U.S. Department of Defense, 21 October 1996.
- U.S. Department of Defense. *Operation of the Defense Acquisition System*. DoD Instruction 5000.2. Washington D.C.: U.S. Department of Defense, 12 May 2003.
- U.S. Department of Defense Office of Force Transformation. *Military Transformation: A Strategic Approach*. Washington D.C.: Department of Defense, Fall 2003.
- U.S. Department of Defense. *Transforming the Defense Industrial Base: A Roadmap*. Washington D.C.: Department of Defense, February 2003.
- U.S. Deputy Under Secretary of Defense (Industrial Policy). *Annual Industrial Capabilities Report to Congress*. Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), February 2003.
- U.S. Deputy Under Secretary of Defense (Industrial Policy). *Business Combinations Desk Book*. Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), September 2003.
- U.S. Deputy Under Secretary of Defense (Industrial Policy). *Defense Industrial Base Capabilities Study: Battlespace Awareness*. Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), January 2004.
- U.S. Deputy Under Secretary of Defense (Industrial Policy). *Frequently Asked Questions*. Washington, D.C.: U.S.: Deputy Under Secretary of Defense (Industrial Policy), January 2004. Available from <<http://www.acq.osd.mil/ip/faq.html>>. Internet. Accessed 30 January 2004.
- U.S. Industrial College of the Armed Forces. "Aircraft." Industrial College of the Armed Forces Industry Studies 2002; <<http://www.ndu.edu/ica/industry/IS2002/2002%20Aircraft.htm>>. Internet. Accessed 12 December 2003.
- U.S. Industrial College of the Armed Forces. "Information Technology." Industrial College of the Armed Forces Industry Studies 2002; <<http://www.ndu.edu/ica/industry/IS2002/2002%20Information%20Technology.htm>>. Internet. Accessed 12 December 2003.
- U.S. Industrial College of the Armed Forces. "Land Combat Systems." Industrial College of the Armed Forces Industry Studies 2002;

- <<http://www.ndu.edu/icafe/industry/IS2002/2002%20land%20combat%20systems.htm> >.
Internet. Accessed 12 December 2003.
- U.S. Industrial College of the Armed Forces. "Shipbuilding." Industrial College of the Armed Forces Industry Studies 2002;
<<http://www.ndu.edu/icafe/industry/IS2002/2002%20shipbuilding%20paper%revised6.htm> >
. Internet. Accessed 12 December 2003.
- U.S. Industrial College of the Armed Forces. "Strategic Supply." Industrial College of the Armed Forces Industry Studies 2002;
<<http://www.ndu.edu/icafe/industry/IS2002/2002%20Strategicsupply.htm> >. Internet.
Accessed 12 December 2003.
- U.S. Joint Chiefs of Staff. *Draft Functional Concept for Battlespace Awareness*. Washington, D.C.: U.S. Joint Chiefs of Staff, 31 October 2003.
- U.S. Joint Chiefs of Staff. *Joint Operations Concepts*. Washington, D.C.: U.S. Joint Chiefs of Staff, November 2003. 23 January 2004.
- Weisman, Jonathan and Renae Merle. "Wearing Out and Adding Up; Army Costs Increase as Terrain Takes Toll on Equipment." *The Washington Post*. 13 September 2003, sec. A, p.1. Database on-line. Available from ProQuest. Accessed 7 November 2003.